



**US Army Corps
of Engineers®**

Engineer Research and
Development Center

Geodynamics Research Facility

Purpose

The Geodynamics Research Facility at the ERDC Geotechnical and Structures Laboratory has evolved over the last three decades to support survivability and protective structures research, with emphasis on investigating new hardened construction materials and facility hardening technologies for retrofits and new designs.

Research at the facility enables GSL to fulfill its role as lead laboratory in the Civil Engineering Subarea of Survivability and Protective Structures, under the Department of Defense Project Reliance.

Specifications

Experimental devices available at the Geodynamics Research Facility provide a wide range of peak pressure and loading rate capabilities. Three gas-driven loaders provide peak-applied forces of 0.45, 2.3, and 8.9 MN in either a quasi-static mode or a dynamic mode with controlled rise times between 3 and 100 msec. Several pressure vessels having peak pressure limits of 7 MPa to 1 GPa accommodate cylindrical specimens with diameters ranging from 152 to 51 mm. Quasi-static servo-controlled experiments are performed with the Facility's 600-MPa pressure vessel and 8.9-MN loader. Cubical specimens can be loaded to peak stress levels of 70 MPa under true 3-D stress states. In the new split Hopkinson pressure bar facility, specimens 12.5 or 19 mm in diameter can be dynamically loaded while applying hydrostatic confining stresses between 0 and 200 MPa.



8.9-MN loader

The facility makes available to researchers a wide assortment of test devices that have been specially designed to investigate the responses of undisturbed soil, backfill, rock, grout, concrete, and other construction materials subjected to a variety of controlled loading conditions, such as uniaxial strain, isotropic compression, and triaxial compression and extension. Several of these devices allow specimens to be backpressure saturated and tested under undrained conditions with pore-pressure measurements.

Benefits

The Geodynamics Research Facility enables researchers to investigate the mechanical behavior of geologic and man-made materials at loading rates and pressures associated with nuclear and conventional explosions, as well as projectile impact and penetration.

Static and dynamic mechanical properties developed from laboratory experiments are used as input to first-principle numerical computer codes designed to predict ground-shock propagation, dynamic soil-structure interaction, and projectile penetration phenomena.

Point of Contact

ERDC Geotechnical and Structures Laboratory
Geodynamics Research Facility (CEERD-GM-I)
E-mail: [Stephen A. Akers](mailto:Stephen.A.Akers@usace.army.mil)
Commercial Phone: (601) 634-2881